

copy 3

5 MAR 1945

FILE

~~RESTRICTED~~
~~CONFIDENTIAL~~

INFORMATION SECTION

5/10

ALLIED TRANSLATOR AND INTERPRETER SECTION
SOUTH WEST PACIFIC AREA
ENEMY PUBLICATIONS

No. 337

DATE: 26 Mar 45

DECLASSIFIED BY: *APJ*
JCS DECLASSIFICATION BRANCH

DATE: *12/2*

CLASSIFICATION CHANGED TO:

By Authority of *DDH 2274, FEC*

Date *29 July 49*

Signature: *Major W.J. Graham, Cav.*
MAJ. W.J. GRAHAM, CAV.

AIRCRAFT MACHINE CANNON AND MACHINE GUNS;
TYPE I LARGE POWER TURRET, MODEL 21

JA
8030
0000
EP
Ni. 337

~~RESTRICTED~~
~~CONFIDENTIAL~~

GENERAL HEADQUARTERS
SOUTH WEST PACIFIC AREA

A.P.O. 500
26 March, 1945

Published for the information of all concerned.

By command of General MacARTHUR:

R. K. SUTHERLAND,
Lieutenant General, United States Army
Chief of Staff

OFFICIAL:

C. A. WILLOUGHBY,
Brigadier General, G.S.C.,
Asst. Chief of Staff, G-2.

CONFIDENTIAL

ALLIED TRANSLATOR AND INTERPRETER SECTION SOUTH WEST PACIFIC AREA ENEMY PUBLICATIONS

No. 337

DATE: 26 Mar 45

Captured Documents and Prisoners of War are sources of Intelligence which the enemy can deny by disciplinary instruction if he becomes aware of the fact that reliable information is being obtained therefrom. Special care must, therefore, be taken to ensure the secrecy of this document. It must be kept under lock and key when not in use. The copy holder is responsible for its safe-keeping. Discretion must be used in its circulation among and disclosure to those serving under the copy holder.

No part of this document may be reproduced by any Service without the permission of its Director of Intelligence.

263

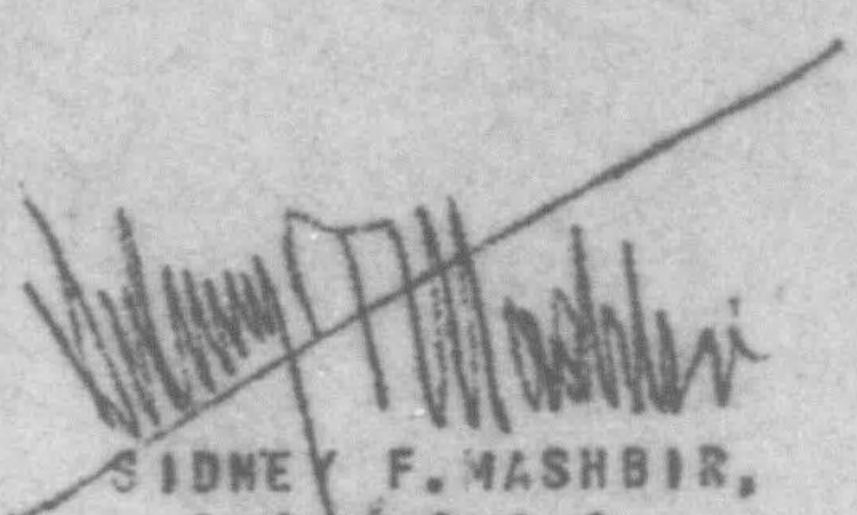
CONTENTS

AIRCRAFT MACHINE CANNON AND MACHINE GUNS: TYPE 'I' LARGE POWER TURRET, MODEL 21

Selective translation of handwritten notebook containing specifications of aircraft machine cannon and machine guns and notes and sketches of Type 1 Large Power Turret, Model 21, kept by YUKISHIGI, Sueo, member of Regular Course of 25th Session, Ordnance Maintenance Training, unit not stated; undated. (Translated by ADVATIS)

(TACLOBAN, LEYTE - 28 Oct 44)

DISTRIBUTION F


SIDNEY F. WASHBIR,
Colonel, S.C.,
Co-ordinator.

CONFIDENTIAL

CONFIDENTIAL

ALLIED TRANSLATOR AND INTERPRETER SECTION
SOUTH WEST PACIFIC AREA

BIBLIOGRAPHIC SUBJECT INDEX
ENEMY PUBLICATION
NO. 337

6,000 Block applies to Army
7,000 Block applies to Navy
9,000 Block applies to Air

I.G. No.		Pages
9570.07	Aircraft Machine Cannon and Machine Guns; Type 1 Large Power Turret, Model 21	
9570	<u>Armament and Equipment - Operational</u>	
9570.07	Specifications of aircraft machine cannon and machine guns and type 1 large power turret Model 21.	1-12

JLR/DAF/MAB/2

BRIEF OF
ENEMY PUBLICATION
NO. 337

Doc No 600556 - Captured TAGLOBAN, LEYTE (28 Oct 44)

Selective translation of handwritten notebook containing specifications of aircraft machine cannon and machine guns and notes and sketches of Type 1 Large Power Turret, Model 21; kept by YUKISHIGE, Sueo, member of Regular Course of 25th Session, Ordnance Maintenance Training, unit not stated; undated. 75 pp.

Contents:

1. Brief history of development of Type 99 20-mm Flexible Machine Cannon, Model 1, Modification 1.	1
2. List of five model-types of flexible machine cannon.	1
3. List of seven types of fixed machine cannon.	1-2
4. Special features of 20-mm machine cannon.	2
5. Shortcomings of the fixed machine cannon.	2
6. Specifications of Type 99 Mk 1 20-mm Flexible (Fixed) Machine Cannon.	2
7. Specifications of Type 99 Mk 1 20-mm Flexible Machine Cannon, Model 11.	3
8. Height of trajectory table for Type 99 Mk 1 and Mk 2 20-mm Machine Cannon.	3
9. Notes and sketches on Type 1 Large Power Turret, Model 21 (used in Types 2 and 97 Large Flying Boat and Type 1 Land Attack Plane).	3-10
a. Data	
b. Shortcomings	
c. Construction	

CONFIDENTIAL

	Pages
10. Specifications of Type 92 7.7-mm Flexible MG, Modification 1.	10
11. Specifications of Type 97 7.7-mm Fixed MG, Model 3, Modification 2.	10
12. Specifications of Type 3 -13-mm Fixed Aircraft MG.	11
13. Special features, defects and specifications of Type 2 13-mm Flexible MG, Model 1.	11-12

ENEMY PUBLICATION NO 337AIRCRAFT MACHINE CANNON AND MACHINE GUNS;
TYPE 1 LARGE POWER TURRET, MODEL 21

MISCELLANEOUS NOTES

Regular Course of 25th Session, Ordnance Maintenance Training

Property of YUKISHIGE, Sueo (*1)

Page 1 I. TYPE 99 20-MM FLEXIBLE MACHINE CANNON, MODEL 11, MODIFICATION 1.

HISTORY:

A. This gun is an OERLIKON Machine Cannon, manufactured by the BAECKER Company, GERMANY, in 1912.

B. 1914-1918: Used both as an aircraft and anti-aircraft gun in World War I.

C. 1919: Manufacture of ordnance was restricted in GERMANY by the VERSAILLES Treaty. Thereafter, experiments on this machine cannon were carried on in SWITZERLAND.

D. 1937: The OERLIKON Machine Cannon was first introduced in JAPAN. Pursuant to Ordnance administrative regulation No 96, Dec 41, it was designated the Type 99 20-mm Machine Cannon. Previously it had been known as the E Type (*2) (TN OERLIKON Type.) 20-mm Machine Cannon.

II. FIVE MODEL-TYPES OF FLEXIBLE MACHINE CANNON.

A. Type 99 Mk 1 20-mm Flexible Machine Cannon, Model 11.

B. Type 99 Mk 1 20-mm Flexible Machine Cannon, Model 11, Modification 1.

C. Type 99 Mk 1 20-mm Flexible Machine Cannon, Model 11, Modification 2.

D. Type 99 Mk 1 20-mm Flexible Machine Cannon, Model 4. The Model 4 is a fixed Machine Cannon, mounted on a power turret and used as a flexible gun.

E. Type 99 Mk 2 20-mm Flexible Machine Cannon, Model 3. This is a Fixed Machine Cannon, modified as a Flexible Machine Cannon.

III. TYPES OF FIXED MACHINE CANNON.

A. Type 99 Mk 1 20-mm Fixed Machine Cannon, Model 2.

B. Type 99 Mk 1 20-mm Fixed Machine Cannon, Model 2, Special.

Machine Cannon designated as "Special" have wire-wrapped barrel.

(*1) etc: -

(1) 幸重末生

(2) 菊式

Page 3

Model 2 series of Machine Cannon are charged and fired by air pressure.

Model 3 series is charged by air pressure and fired electrically.

Model 4, Mk 2 series is hydraulically charged and fired electrically.

Model 4 series is hydraulically charged, fired electrically and belt fed.

IV. SPECIAL FEATURES OF THE 20-mm Machine Cannon.

A. The cannon is fired when the firing pin strikes the primer, 10-mm before the bolt is fully closed, as the recoiling parts are driven forward by the driving spring. The driving force of driving spring and the blowback pressure counteracts each other at the time of firing mitigating the shock.

B. Forced feeding.

C. Light weight.

D. Little reinforcement of the airframe is required for mounting this gun.

E. Recoil is negligible.

F. Parts are highly interchangeable.

G. The mechanism and maintenance is simple.

H. The projectile is powerful.

V. SHORTCOMINGS OF THE FIXED MACHINE CANNON.

A. Small numbers of rounds of ammunition carried.

B. Immediate action cannot be taken in case of stoppages.

Page 4 VI. TYPE 99 MK 1 20-MM FLEXIBLE, (FIXED) MACHINE CANNON.

Specifications:

Caliber 20 mm.

Length of barrel (38 calibers) 760 mm.

Overall length 1.653 m.

Rifling $1\frac{1}{4}$ turn right hand twist

9 x lands and grooves

Pitch angle = 7° right

MV 600 m/sec.

Rate of fire 520 rds/min

Total weight (less magazine) 30.220 kg.

Type of barrel Nickel-chrome steel.

Life of the Machine Cannon 10,000 rds.

Capacity of magazines $\left. \begin{array}{l} 45 \\ 60 \\ 100 \end{array} \right\} \text{rds.}$

Page 9 VII. TYPE 99 MK 1 20-MM FLEXIBLE MACHINE CANNON, MODEL 11.

A. Specifications:

Caliber 20-mm
 Length of barrel 760-mm
 Overall length 1.6535 m
 Rifling: $1\frac{1}{4}$ turn, right hand twists
 9 x lands and grooves,
 Pitch angle = Right 7° .
 MV 600 m/sec.
 Rate of fire 520 rds/min.
 Total weights (less magazine) 30.220-kg.

B. The flash hider decreases the dispersion angle of the safety pins from 8° - 9° to 3° - 4° (TN Sic.)

Page 15 VIII. HEIGHT OF TRAJECTORY TABLE FOR TYPE 99 MK1 AND MK2 20-MM MACHINE CANNON.

Range	100-m	200-m	300-m	400-m	500-m
Mk 2	0.09-m	0.39-m	0.92-m	1.73-m	2.87-m
Mk 1	0.1145-m	0.628-m	1.510-m	3.014-m	4.945-m
7.7-mm Flexible	0.095-m	0.408-m	0.996-m	1.928-m	3.295-m

Page 19 IX. TYPE 1 LARGE POWER TURRET, MODEL 21.

A. Data.

1. Manufacturers: KAWANISHI Airplane Co, Ltd.
2. Used in: Type 97 Large Flying Boat.
Type 1 Land Attack Plane.
Type 2 Large Flying Boat.
3. Machine Cannon.
 - a. Type 99, 20-mm Flexible Machine Cannon, Model 4.
 - b. Magazine capacity 45 rds
 - c. Traverse 360°
 - d. Elevation 85°
 - e. Depression -25°
4. Motor
 - a. Voltage required for motor 12 volts
 - b. Maximum speed 5,500 rpm
 - c. Maximum rate of traverse $40^{\circ}/\text{sec}$
 - d. Rate of elevation $30^{\circ}/\text{sec}$

5. Oil pressure 60 kg/cm²cm.
6. Air pressure 40 kg/cm²cm.
7. Outer diameter 1.110 m
8. Weight 125 kg.

9. Has device to make corrections for speed of airplane on which mounted and a reflector sight, enabling accurate sighting.

Page 20

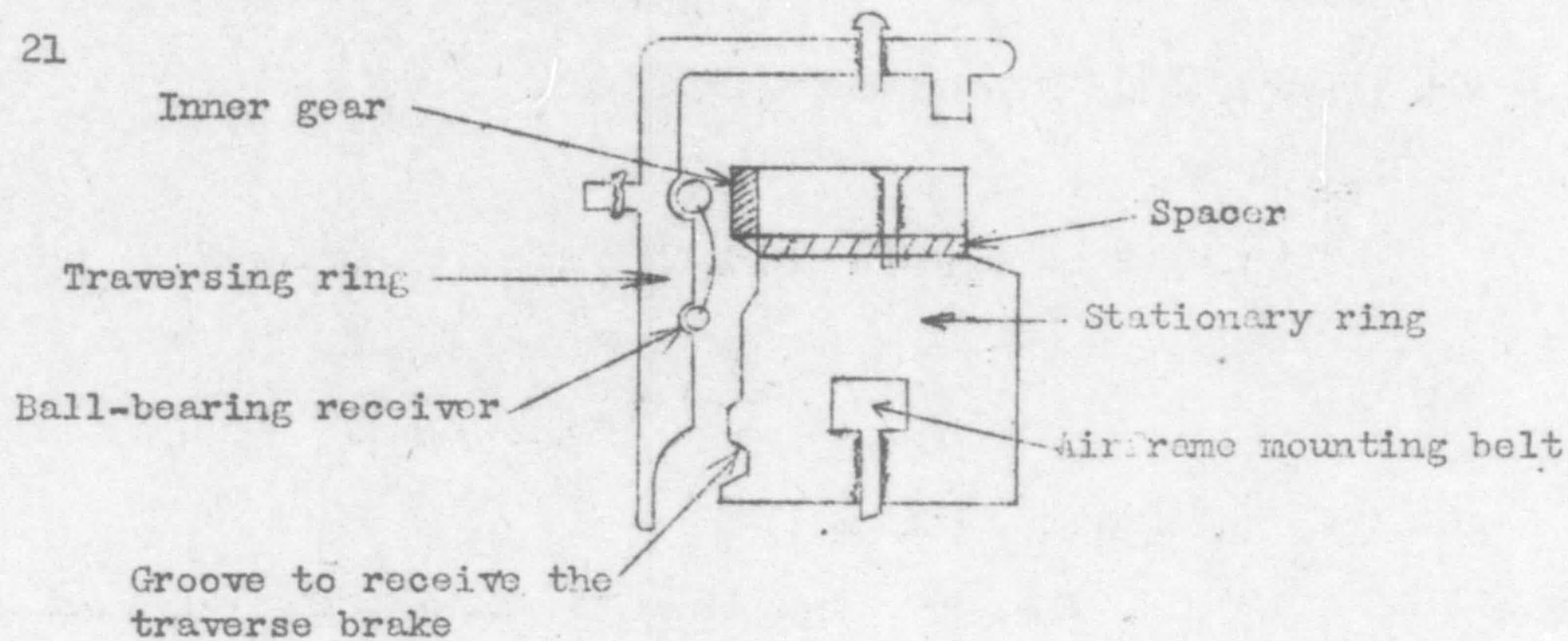
B. Shortcomings:

1. Mechanism is complicated and hard to handle.
2. Adds much weight.
3. Difficult to mount in an airplane.
4. Decreases the number of Machine Guns that can be installed in an airplane. Difficult to handle for the inexperienced.

C. Construction:

(TN PRESUMABLY SIDE VIEW OF TURRET.)

Page 21



(TN Exact tracing from the original document.)

Page 22

1. Ring seat.

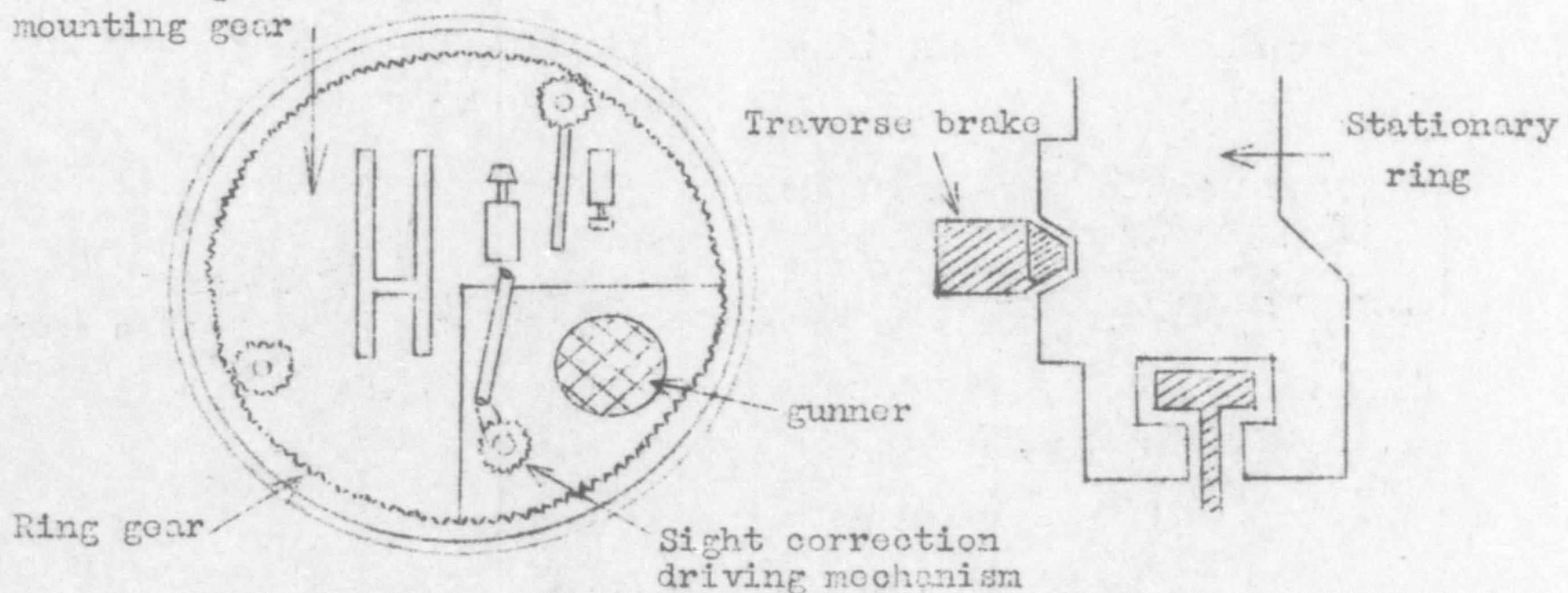
a. Consists of a fixed ring, ball-bearing race, ring gear. Diameter about 1 m.

b. The top inner surface of the ring gear is used to traverse the mount. The ring gear meshes with the traversing gear, manual traversing gear and gear for the sight correction driving mechanism.

c. The traversing ring rides on the ball-bearing race over the fixed ring and is supported by the bearing. The ball-bearing race facilitates traverse.

(TN SCHEMATIC SKETCH OF TRAVERSING GEAR FOR POWER DRIVEN TURRET.)

Traversing mechanism
mounting gear



(TN Exact tracing from the original document.)

2. Machine Cannon mounts.

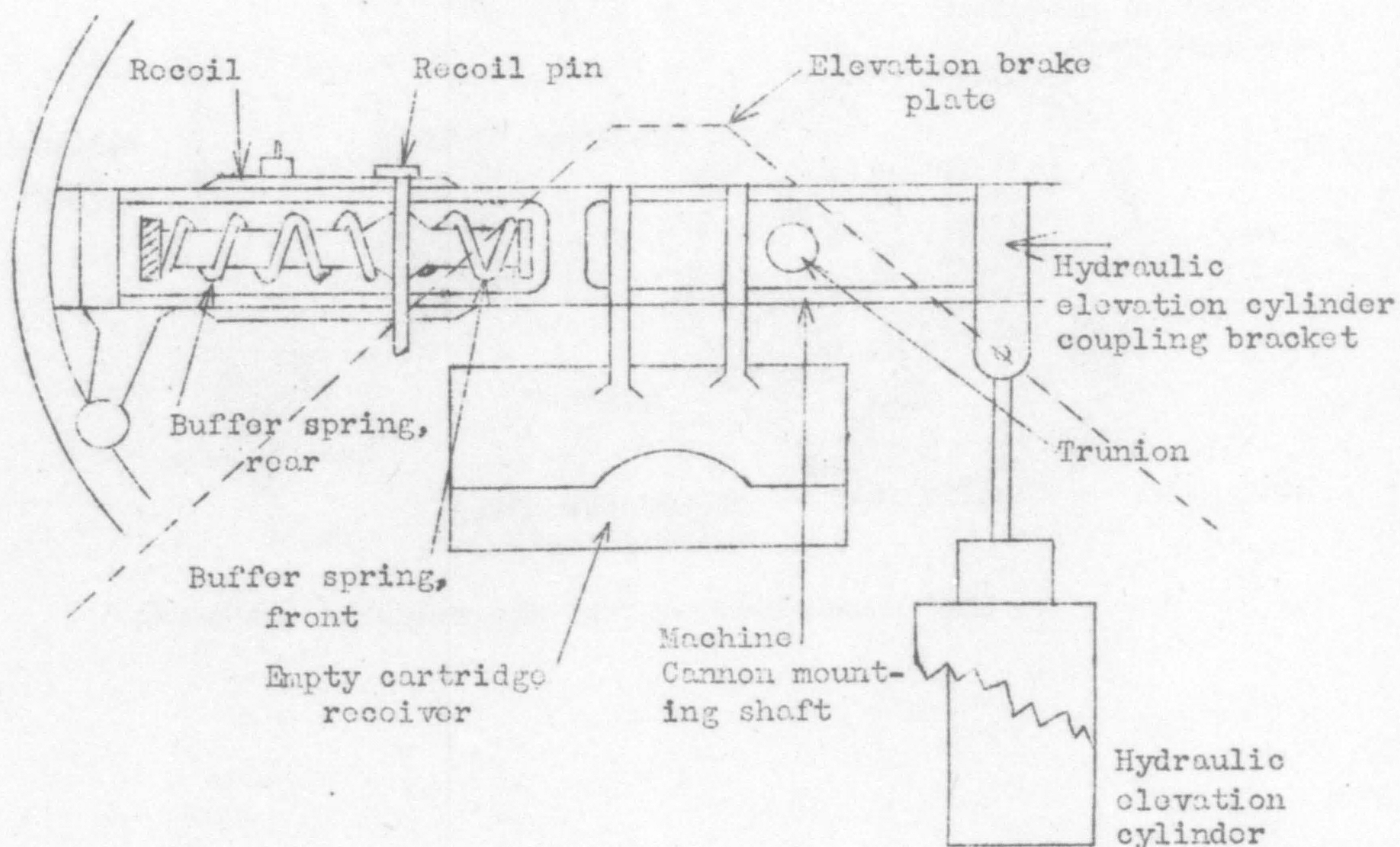
a. Consists of a Machine Cannon mounting shaft, mounting shaft support plate, and empty cartridge receiver.

b. Also, two mounting shafts, one on each side, which are connected to the trunnion (elevating pivot).

c. The mounting shaft houses a buffer spring which absorbs the recoil at the time of firing.

d. There is an elevation braking device which brakes the elevation of the mounting shaft by compressed air at the same time the gun is fired.

(TN GUN MOUNTING BRACKET.)



(TN Exact tracing from the original document.)

3. Electrical system.

Page 23

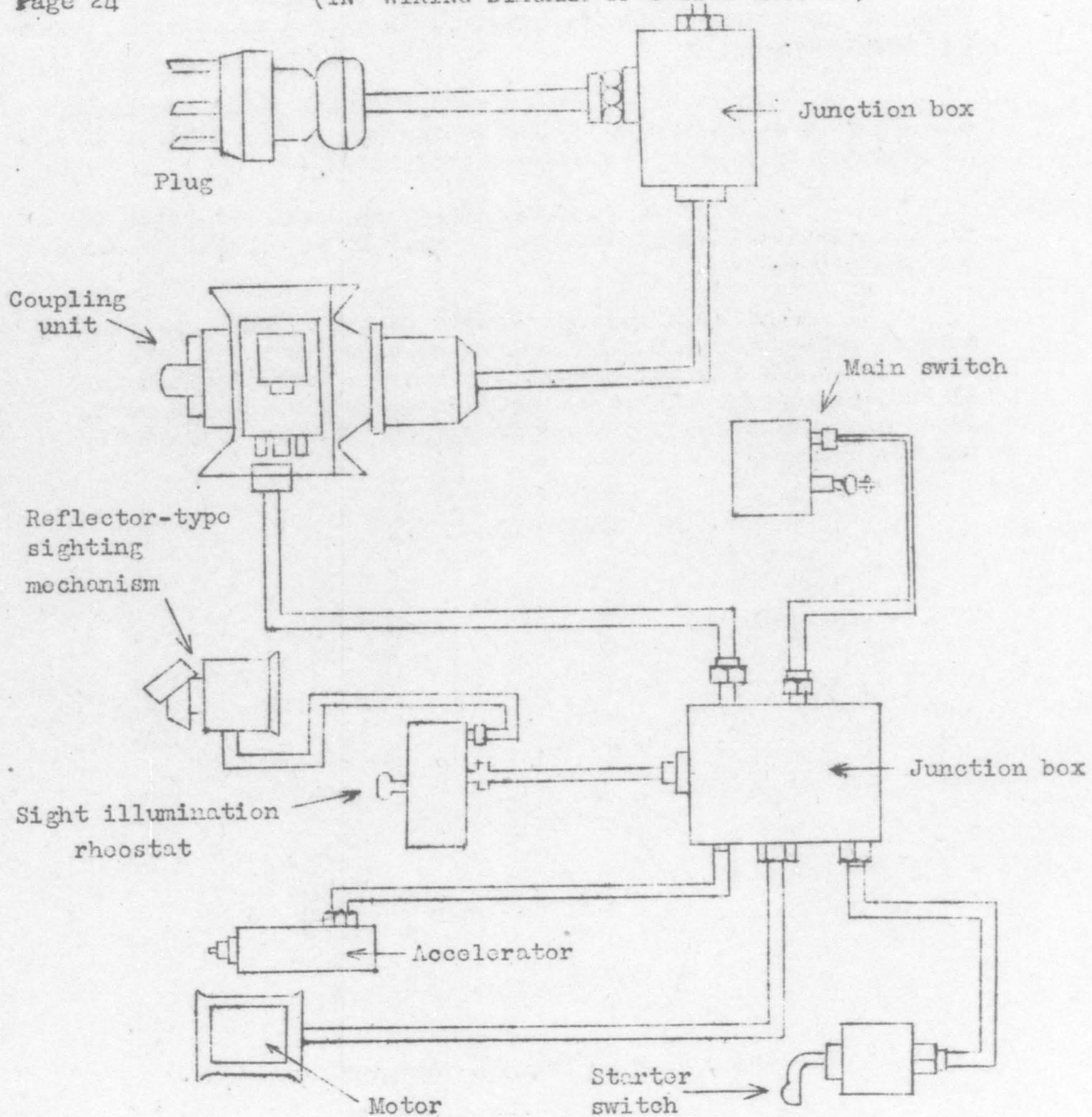
a. The 12 V power supply of the airplane is used to supply power to the motor, which is the motive power of the hydraulic pump, and to illuminate the sighting instrument.

b. Component parts are as follows:

Motor, coupler, starter, accelerator (rheostat) junction box, main switch, sight illumination rheostat.

Page 24

(TN WIRING DIAGRAM OF SWITCH LAYOUT.)



(TN Exact tracing from the original document.)

Page 24

4. Motor.

DC shunt wound motor. There is a hydraulic pump attached to the underside.

a. The coupling unit feeds the current to the gun mounts and eliminates all pulsating current. Also, a compressed air pipe line runs through the center of the coupler.

b. The main switch is mounted on the control panel. When the switch is pushed forward, the circuit is closed and when it is pulled backwards, it is opened.

c. The starter is the starter switch for the motor. When the operating handle is gripped, it closes the switch, starting the motor.

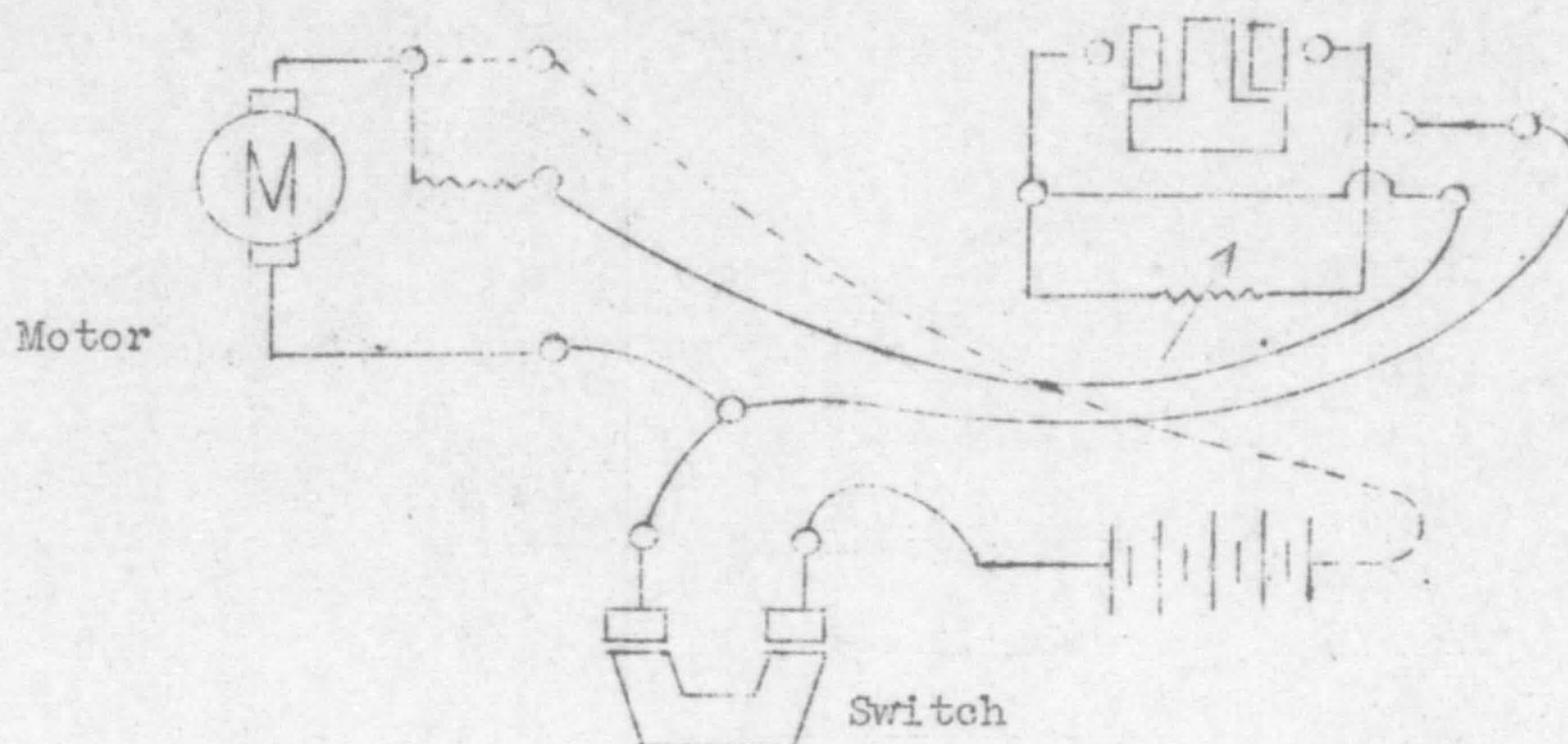
d. The accelerator is a rheostat which accelerates the motor by regulating the flow of current to the motor. It is operated by a knob on the operating handle.

f. The sight illumination rheostat regulates the illumination of the sighting mechanism. It is mounted on the control panel.

g. When the main switch in the cockpit, is closed, current passes through the coupling unit and is fed to the main switch (TN For the turret.). When the turret switch is closed, the current flows to the junction box which, in turn, feeds the current to the motor starter, reflector type sight, and accelerator.

Page 26

(TN WIRING DIAGRAM.)



(TN Exact tracing from the original document.)

5. Hydraulic system.

a. This system is the principal component of the gun turret. It traverses and elevates and depresses the gun.

Page 27

b. The component parts of the hydraulic system are as follows: Hydraulic pump, traversing mechanism, traversing mechanism base, operating lever, hydraulic elevation, actuating cylinder, hand operated selector grip, hydraulic selector latch and a compressed air cylinder.

c. One set of the four oil pipes that lead from the hydraulic pump is connected to the traversing mechanism, and the other set is connected to the hydraulic elevation actuating cylinder. When operating lever is at center, even though the motor may be running, no oil pressure is produced. When the lever is moved forward, rearward, to the left or to the right, the pump sends oil under high pressure, causing the gun mount to move.

d. Pipe line colors.

(1) Red - Firing system.

(2) Greenish-yellow - Hydraulic system.

(3) White - Air

e. Hydraulic pump - The hydraulic pump is attached under the motor and driven by reduction gears. It has an operating lever on the right side and consists of guide fitting, revolving cylinder, eccentric guide, stationary shafts and an oil reservoir. The gears, connected to the motor, drive the two planet gears which, in turn, rotate the two revolving cylinders (upper and lower) about the stationary shafts. The cylinders have five spring loaded plungers. When the operating lever fitted to the eccentric guide is actuated, the guide moves a maximum of 3.5 mm in all horizontal directions.

The rear plunger is compressed when the operating handle is moved forward. The spring loaded front plunger protrudes, creating a vacuum inside which opens the intake valve, and causes the oil from the reservoir to be drawn into the cylinders. Because the cylinders are always rotating the plunger is gradually depressed, forcing the oil through the oil pipe connected to the underside of the pump to the traversing mechanism and the hydraulic elevation-actuating cylinder.

There is a safety valve to regulate the oil pressure should it become greater than 40 kg/cm^2 and also an intake valve to supplement a drop in oil pressure due to leakage.

f. Traversing mechanism: The traversing mechanism is mounted to the traversing mechanism mounting base on the right rear of the turret. It receives the oil pressure from the pump to traverse the gun turret through a system of gears. On the circumference of the inner stationary tube there are seven plunges with rollers on the ends to assist rotation.

Page 28

The high pressure oil which is fed from the oil pump passes to the inner side of the plunger through two opposite holes in the inner-side of the stationary shift and forces the plungers outward. Because there are rollers on the end of the plungers, the traverse cylinder traverses in conformity with the cammed surface of the inner side of the

Page 29

eccentric guide. The plungers are gradually depressed, forcing the oil through the hole of the stationary tube and through the oil pipes back to the oil pump. The traversing mechanism has a high pressure oil intake pipe, an outlet pipe and a pipe to return the leakage back to the oil pump.

Page 30 X. TYPE 92 7.7-mm FLEXIBLE MG, MODIFICATION 1.

Specifications:

Caliber 7.7 mm.
 Operation Gas-operated.
 MV 744 m/sec.
 Rate of fire Approx 650 rds/min.
 Total length 982.5 mm.
 Length of barrel 664.3 mm.
 Rifling Right hand twist, 5 x lands and grooves, one twist in 254 mm.
 Total weight (including sights and empty cartridge receiver) 8.652 kg.
 Weight of barrel 1.651 kg.
 Weight of recoiling parts 0.880 kg.
 Weight of magazine
 Empty 1.655 kg.
 Full 4.128 kg.
 Bore pressure 29.9 kg/mm².
 Tension of driving spring 10-12 lbs.
 Length of cartridge 78 mm.
 Weight 25.5 g.

Page 49 XI. TYPE 97 7.7-MM FIXED MG MODEL 3, MODIFICATION 2.

Specifications:

Operation Recoil-operated.
 Caliber 7.7 mm.
 MV 747 m/sec.
 Bore pressure 299 kg/mm².
 Overall length 1.034 m.
 Length of barrel 721.4 mm.
 Total weight 13.4 kg.
 Rate of fire About 900 rds/min.
 Rifling Right hand twist, 5 x lands and grooves, one turn in 25.4 cm.
 Length of recoil:
 Firing mechanism 120 mm.
 Barrel 18.5 mm.
 Weight of barrel 1.722 kg.
 Types of ammunition Various types.
 Weight of cartridge 25.5 g.
 (TN Specifications of flexible version of same gun are exactly the same as listed above.).

Page 63 XII. TYPE 3 13-MM FIXED AIRCRAFT MG.

Specifications:

Operation Recoil-operated
 Caliber 13.3 mm
 Rifling Left hand twist,
 8 x lands and grooves
 Rate of fire 800 rds/min
 MV 800 m/sec
 Length of barrel 900 mm.
 Total weight 28 kg.
 Total length 1530 mm.
 Weight of barrel 5.105 kg.
 Cartridges
 Length 136.6 mm.
 Weight 121 g.
 Weight of projectile 50.2 g
 Weight of propellant 14.5 g.
 Weight of belt link (10) 181 g.

Page 64 XIII. TYPE 2 13-mm FLEXIBLE MG, MODEL 1.

A. Special fixtures.

1. Copied after the GERMAN RHEINMETALL Machine gun.
2. Has high muzzle velocity and high rate of fire.
It is a manually operated flexible machine gun. The gun is accurate and dispersion of shots is comparatively small.
3. It is small, light and easy to operate (No larger than the 7.7 mm flexible machine gun used at the present).
4. The mechanical functioning is very good.
5. It is belt-fed, allowing a large amount of ammunition to be carried.

B. Defects.

1. Parts are not easily interchanged. Great care is needed in handling.
2. The shock brought to bear on the gun mount is very great. (It is much greater than that of the 7.7 mm gun currently used.)
3. Since the ammunition is belt-fed, there are certain drawbacks when firing in air.

Page 69

C. Specifications:

Operation Recoil-operated.
 MV 750 m/sec.
 Rate of fire 900 rds/min.
 Overall length 1.169 m.
 Weight 7.14 kg.
 Weight of recoiling parts 4.64 kg.

Barrel:

Caliber 13-mm.
Rifling Right hand twist
8 x lands and grooves
Length 550-mm.
Weight 1.615 kg
Bore pressure 3500 kg/cm².

Method of feed. Belt
Method of charging and firing Manual.
Ammunition belt (ball and tracer) 1000 rds

Length 24.8 m
Weight 84.0 kg.

Weight of one link 10 g.

END